holographic display apparatus **100** of FIG. **12** includes a light path converter **180** having a curved surface beam separation film **181**.

[0100] The light path converter **180** may be a beam splitter including the beam separation film **181** having a concave curved surface with respect to a first incident surface **180***a*. The light path converter **180** may have two portions split by the beam separation film **181** that are joined with respect to the beam separation film **181** by a boundary. The two portions of the light path converter **181** may have substantially the same refractive index.

[0101] The beam separation film **181** of the light path converter **180** may be a half mirror. In this case, light emitted by a light source unit **110** does not need to be a polarized light.

[0102] As another example, when the light emitted by the light source unit **110** has polarization, the beam separation film **181** of the light path converter **180** may be a polarization selective reflection film. For example, the beam separation film **181** may have polarization selectivity so that the light of a first polarization incident on a first incident surface **180***a* (i.e., polarization light emitted from the light source unit **110**) is reflected by the beam separation film **181**, and the light of a second polarization is transmitted. Since the external light Lo has both a first polarization component and a second polarization component orthogonal to a first polarization direction, if the beam separation film **181** has the polarization selectivity, only the second polarization component included in the external light Lo incident on a second incident surface **180***b* may be transmitted through the beam separation film **181** and may reach the pupils **13** of the user's eyes **11**.

[0103] The curved surface of the beam separation film **181** may be designed such that a light beam incident on the first incident surface **180***a* is reflected and focused in the beam separation film **181** to form the VW in front of the pupils **13** of the user's eyes **11**. Focusing of the light beam by the beam separation film **181** may replace a function of the field lens **170** described with reference to FIGS. **1** through **10** or the field reflection mirror **670** described with reference to FIG. **11**. Thus, the light path converter **180** may be provided at a location corresponding to a location of the field lens **170** described above. For example, the light path converter **180** may be provided such that the beam separation film **181** is placed near the image plane (refer to **172** of FIG. **3**) on which a hologram image transferred from the relay optical system **140** is imaged.

[0104] Since the two portions of the light path converter **180** joined with respect to the beam separation film **181** by a boundary have substantially the same refractive index, when the external light Lo passes through the beam separation film **181**, no refraction occurs. In other words, the external light Lo passes through the beam separation film **181** without a refraction, and a user may see an outside scene without a distortion.

[0105] FIG. **13** is a schematic diagram of an optical system of a see-through holographic display apparatus **100** according to an exemplary embodiment.

[0106] Referring to FIG. **13**, the optical system of the see-through holographic display apparatus **100** of the present exemplary embodiment is substantially the same as the optical system of the see-through holographic display apparatus **100** described with reference to FIG. **7**. The see-through holographic display apparatus **100** further includes a light beam selective optical element **890**, and thus differences will be mainly described below.

[0107] The light source unit **110** may provide polarization light. As described with reference to FIG. **2**, when the light source unit **110** emits polarization light, the light brancher **130** may be a polarization beam splitter, and a polarization converting member such as a ¼ polarization plate (not shown) may be further provided between the light brancher **130** and the spatial light modulator **120**. A light path converter **180** may have polarization selectivity and include a beam separation film **181** formed in a predetermined curved surface. As described with reference to FIG. **12**, the beam separation film **181** may have polarization selectivity so that light of a first polarization incident on a first incident surface **180***a* (i.e., polarization light emitted from the light source unit **110**) is reflected, and light of a second polarization is transmitted. Since the external light Lo has both a first polarization component and a second polarization component orthogonal to a first polarization direction, only the second polarization component included in the external light Lo may be transmitted through the beam separation film **181** and reach the pupils **13** of the user's eyes **11**. As will be described below, the light beam selective optical element **890** may have positive (+) refractive power only with respect to the light of the first polarization and may have no refractive power with respect to the light of the second polarization. Thus, the curved surface of the beam separation film **181** may be designed in consideration of the refractive power of the light beam selective optical element **890**.

[0108] FIG. **14** is a diagram of an example of the light beam selective optical element **890**. The light beam selective optical element **890** of FIG. **14** is a polarization dependent lens of different refractive indexes with respect to light of a first polarization and light of a second polarization. Referring to FIG. **14**, the light beam selective optical element **890** may be a cemented lens in which a first lens **891** and a second lens **892** are cemented. The first lens **891** may be an isotropic lens including, for example, glass or an isotropic polymer material. The second lens **892** may be an anisotropic lens including an anisotropic polymer material of a different refractive index according to a polarization direction. The second lens **892** including the anisotropic polymer material may have a refractive index different from the first lens **891** with respect to light of a first polarization and may have substantially the same refractive index as the first lens **891** with respect to light of a second polarization. An incident surface **890***a* of the first lens **891** of the light beam selective optical element **890** and an emission surface **890***c* of the second lens **892** of the light beam selective optical element **890** may be flat surfaces. A boundary surface **890***b* between the first lens **891** and the second lens **892** may be a curved surface having a predetermined curvature. The curved surface of the boundary surface **890***b* may be designed that a light beam of the first polarization incident on the incident surface **890***a* of the light beam selective optical element **890** is focused to form a VW in front of the pupils **13** of the user's eyes **11**.

[0109] An operation of the see-through holographic display apparatus **100** of the present exemplary embodiment will now be described in brief.

[0110] Light having polarization emitted by the light source unit **110** may have predetermined hologram image information and may be diffracted via the spatial light